1863MNRAS..23..155L

M. le Prof. Gautier.
Comm. Gilliss.
J. Glaisher, Esq.
M. J. von Gumpach.
Dr. A. Hanggi.
M. Hankel.
Prof. Hansen.
J. Herapath, Esq.
J. R. Hux, Esq.
Mrs. Hannah Jackson.
J. Jopling, Esq.
Dr. Lee.
M. Mailly.
M. Mozzi Michaly.
M. J. H. Milberg.
M. L'Abbé Moigno.
M. C. Nagy.
H. A. Newton, Esq.
Dr. Oudemans.
Dr. Peters.
Prof. Plantamour.
Dr. Pratt.
M. Quetelet.
J. Reddie, Esq.
F. Rollaston, Esq.
Dr. J. Schönfeld.
W. Scott, Esq.
Prof. Secchi.
Rev. Prof. Selwyn.
S. Sharpe, Esq.
Capt. Shea.
M. Simler.
Messrs. Smith, Beck, and Beck.
Admiral Smyth.
John Stow, Esq.
Sig. R. Tocani.
C. Todd, Esq.
Capt. H. Toynbee.
C. A. Twining, Esq.
G. V. Vernon, Esq.
C. Vignoles, Esq.
M. J. Villarceau.
J. J. Waterston, Esq.
G. Whiting, Esq.
Messrs. Willis and Sotheran.
M. Winnecke.
Dr. R. Wolf.
H. Worms, Esq.
J. Yates, Esq.
Dr. A. Ziegler.

Address delivered by the President, Dr. Lee, on presenting the Gold Medal of the Society to M. Argelander.

Gentlemen,—The established custom of this Society enjoins me to undertake the important duty of addressing you on the termination of our year of office, and of resigning into your hands the trust which you confided to me. But my gratification on this occasion is mixed with regret, inasmuch as this is the last time that I shall have the honour of speaking officially to you as President of the Royal Astronomical Society. The first idea which now occurs to me, is that of requesting you to accept of my respectful and grateful thanks for the honour which you have conferred upon me in placing me in this chair,—an honour which will be the source of pleasing reflections during the remainder of my days; and, whilst feeling that only a zeal for your interests, and in a life-long desire to promote the advancement of our noble Science, I can pretend to vie with those eminent men who have preceded me in this Presidency.

1863MNRAS..23..155L

The opportunities of great discoveries in the regions of space, or in the theory of the grand and simple laws which rule the motions of those vast bodies which decorate the heavens, have not entirely passed away. The times of Kepler and of Newton, of Lagrange and of Bradley, will not again return. Where they reaped the rich harvest of astronomical truths we can but glean. We must rest content with the investigation of what has been well termed, by Sir John Herschel, "Residual Phenomena."

The principal Observatories of Europe, and of Africa, and of Asia, and of America, are now engaged in the gradual accumulation of systematic observations, and in recording facts, which, hereafter reduced to order, will serve as bases of verification of the accepted theories of our time, or will themselves become the germs of new theories, or the elements of undiscovered laws among the Astronomers of future ages.

Within the comparatively short period of the existence of this Society, of which Sir William Herschel was the first President in 1820, and of which, two of the Council, and two of the three original Secretaries are still existing, and shining as stars of the first magnitude in their diverse regions of Science, and all of them being Members of the Royal Society, what a world of splendid incidents, bearing on its pursuits, have been revealed to skill and perseverance!

Such are, The improved knowledge of Cometary Motion; the investigation of the Nebular Theory; the repetition of the Cavendish Experiment; the "Resisting Medium" discussion; the taking of Transits by Galvanism; the Chronoscopic intercourse between Observatories; the Electric Telegraph, and its application to the longitudes of places; the Undulatory Movement of Light; the application of the new and surprising art of Photography to the Sun, the Moon, and even the double stars; the detected affinity between the Solar Spots and Terrestrial Magnetism; the orbits of Binary Stars; the lines of the Solar Spectrum; the triumphant winning of Neptune, and the finding of upwards of seventy Minor Planets between *Mars* and *Jupiter*.

Amongst those things deserving of record in the progress of celestial observations within the last two years, it would be unpardonable in me, were I to pass over in silence the dauntless excursions in the firmament undertaken by our indefatigable colleague, Mr. Glaisher, and his fearless companion, Mr. Coxwell. At one time much was expected to accrue to Meteorological Science from aeronautic expeditions; but I think it may be safely conceded, that from the days of Gay Lussac and Biot to our own, little has been done deserving of scientific record until the important discoveries which these two gentlemen have brought to our knowledge by their successful balloon ascents during the preceding year.

Such are the great and interesting results extracted from

1863MNRAS..23..155L

the recesses of nature, by skill and perseverance, in the brief span of time to which I have alluded; and it is gratifying to recollect the practical aid which some of our Members have rendered towards the advancement of these invaluable branches of Science, as well as the Society's liberal recognition of all the labourers in this vineyard, whatever clime or country they pertained to. This is well exemplified by noting the awards to merit made from year to year by our successive Councils; and in this, as you are all aware, it has been a principle well understood and acted upon in the adjudications, that the mere official product of public establishments, however admirably executed, is not to be placed in competition with those spontaneous investigations which spring from the voluntary ardour of individual exertions, unless improved methods are introduced.

In illustration of this, I may remark that our exponents of high approbation of astronomical labours are seen in the bestowal of our honorary distinctions.

Since the founding of this Society in 1820, there have been forty-three medals awarded to merit, of which nineteen have been bestowed on foreigners, and twenty-four on our own countrymen, a very fair proof of the cosmopolite principles on which we have hitherto acted.

I now come to the subject which is the principal object of this Address, namely, the Council's award of the Gold Medal for this year to F. W. A. Argelander, the distinguished Professor of Astronomy at the University of Bonn, in Prussia, —a gentleman whose high claims will occur to you all, on a recollection of his able superintendence of the several observatories of Abo, Helsingfors, and Bonn, the various works which he has published, and the numerous communications which he has made to the scientific public in Baron de Zach's *Correspondance Astronomique*, and the *Astronomische Nachrichten.* The Observatory of Bonn was founded by the laudable and intelligent spirit of the Kingdom of Prussia, and the whole of the expenses of the establishment are supported by the well-bestowed liberality of that country.

A large portion of the Professor's researches has been devoted to that crucial element, the Proper Motions of the Stars. The general method of ascertaining these has been by comparing two sidereal Catalogues with a considerable interval between their epochs, thereby to detect any difference which does not correspond with the amount of the precession of the equinoxes; yet, as the earlier catalogue is more liable to the consequences of instrumental errors than the more delicate observations of recent days, the real truth can only be extracted from repeated operations and improved methods. Numbers of supposed erratic bodies are cleared off the working list at each succeeding course of investigation; but those which are thereby confirmed and proved, become of the gravest importance for

1863MNRAS..23..155L

all future investigations of the Stellar Laws. To this problem Argelander applied his experience and skill with such success, that in the year 1835 he published his well-known Catalogue of 560 Stars, with their motions as determined by his observations in Finland. Under this examination he assumed, that of the 560 stars, 390 of them had proper motions exceeding 0″·1 per annum; and from this he deduced a very interesting result relative to the movement of the Solar System towards a point in the heavens, presenting a near agreement with that which was roughly conjectured fifty-two years before, by our peerless extra-meridian Præses, the late Sir William Herschel.

By the refined investigation of the Abo results, the co-ordinates of the point in question, referred to the mean equinox of 1792, are

R.A. = 259° 47′·6 with a probable error of 3″·28
Dec. = + 32° 29′·5 do. 2″·20

The course of these studies led the Professor to estimate the comparative magnitudes of the stars by the unassisted eye, and he arrived at the conclusion, that in the space between the North Pole and 30 degrees of Southern Declination, there are 3256 stars visible to the naked eye.

Many faint stars had been included in former celestial charts, while brighter ones had been neglected. Argelander found about twenty stars which, though visible to the naked eye, were not contained in any trustworthy Catalogue. The importance of thus giving to future astronomers the means of judging whether any gradual and very slow changes are taking place in the relative magnitudes is sufficiently evident. He also watched assiduously for the changes attributed to those singular bodies, the Variable Stars. Hence followed his remarkable disquisition from his own personal observations, on the double maximum and minimum curve of β *Lyræ*, in 1843; a result which, though differing in particulars, confirmed the researches of our countryman (Goodricke) in 1784; to whom is due the discovery of the changes of brightness in β *Lyræ*. This memoir, perhaps, stimulated the attention of modern observers upon the strange phenomena which these stars exhibit. This course he has followed out with signal success; and in our *Monthly Notices* for June 1856, we have copied from the *Astronomische Nachrichten* his able suggestions respecting a "Method for determining the Brightness of the Minor Planets."

In the same *Notices* for December 1861 is a Report on the progress of the admirable Star-Charts in course of execution at Bonn. It is communicated by our indefatigable colleague, Mr. Carrington, who received it from Dr. Krüger, by the direction of Professor Argelander.

This is a singularly interesting Report. It describes the various parts of the magnificent Catalogue, which will embody

1863MNRAS..23..155L

30,000 (accurately) determined stars. It is, therefore, well deserving of a reperusal by all our Members, as it explains lucidly what portions of the Stellar Zones are finished and fully published. Also, the part which was in the press, and what share remained in the press at that time, are duly detailed; and it must be a matter of gratification to an English reader, that the Catalogues of our Members,—Groombridge, Johnson, and Carrington,—have been closely consulted in the construction of this great product of science; and they are associated with the eminent foreigners, Lalande, Piazzi, Bessel, Struve, Schwerd, and Rümker.

The remark at the conclusion of this communication is deserving of our full attention, and, I think, approbation; namely, "That the Fellows of this Society, and all to whom "this account comes, cannot fail to admire the stately progress "of this enormous work, which, simple in its conception, and "free from insurmountable difficulties in execution, would "*appal* many an astronomer by its vast extent."

The Zone Observations of Dr. Argelander, contained in the first two volumes of his work, and made at Bonn, are of great importance. This extensive and valuable work may be looked upon as a continuation of Bessel's Zone Observations. These latter were limited by the parallels of 15° South and 45° North Declination. The Zones contained in Dr. Argelander's first volume extend from 45° to 80° of North Declination, and those in the second volume from 15° to 31° of South Declination. As in Bessel's Zones, the observations of each Zone are accompanied by an Auxiliary Table for reducing the apparent places of the stars observed, to the mean places for a given epoch. For the Zones in the first volume, the epoch chosen is the beginning of 1842, and for the second the beginning of 1850. The former Zones contain 26,424 separate observations, of which about 4000 are duplicate, so that the number of different stars contained in them is about 22,000. The latter, or Southern Zones, contain 23,250 observations, of which about 5600 are duplicate; so that the number of separate stars is about 17,600.

Thus we have a total of nearly 40,000 stars, whose places have been determined with very considerable accuracy, the probable error of a determination of Right Ascension corresponding to an equatoreal interval scarcely exceeding $0^s \cdot 1$, and that of a determination of Declination scarcely exceeding 1″, except for some of the more Southern Zones.

Bessel's Zones comprise about 75,000 observations of nearly 62,000 different stars. Mr. Carrington's excellent Redhill Catalogue contains the places of nearly 4000 stars between the Pole and 81° of North Declination, the observations being made on a somewhat more extended plan than those of Bessel and Argelander.

Thus, by the junction of the labours of these three astronomers, the places of above 105,000 stars lying between the

1863MNRAS..23..155L

North Pole and 31° of South Declination have been well determined. It would be highly desirable that Zone observations on a similar plan to that of Bessel and Argelander, should be undertaken by some zealous astronomer in the Southern Hemisphere, so that the survey might be extended to the South Pole.

Vast as is the number of stars whose places have thus been determined, it is far exceeded by the number recorded in Dr. Argelander's Survey of the Northern Heavens, which forms the basis of his beautiful new Star-Charts, and for which your Council have awarded him the Medal of the Society.

The first section of this work, forming the third volume of the *Bonn Observations*, contains the approximate places of 110,984 stars between 2° South and 20° North Declination. The second section, forming the fourth volume, contains the approximate places of 105,075 stars between 20° and 40° of north declination.

Dr. Argelander's plan of survey extends to the whole of the Northern heavens; but, in the hope that a similar survey may be undertaken in the Southern hemisphere, he includes the first two degrees of Southern declination, for the sake of affording means of comparison between the two works.

Within the above-mentioned limits the Charts were to contain all stars down to the 9th magnitude, as far as possible all the brighter ones of the 9-10 magnitude, and as many of the remainder of this class as circumstances permitted. The magnitudes were not to be more than a half-class in error, and the positions in both co-ordinates not more than one minute in error, so that every star in the Charts might be at once found again in meridian instruments; and that, with respect to neighbouring stars, no doubt should occur which was meant. All gross errors in existing Star-Catalogues were also to be noticed and corrected, whether they related to the magnitudes or positions of the stars.

As an instance of the utility of this work of Dr. Argelander, it may be mentioned that this survey immediately supplied proper stars to be compared with *Mars*, with the view of determining his parallax by equatoreal observations during the last autumn. Also, it enables us at once to identify stars that have been compared with planets and comets. Also, to detect and correct any errors of entire minutes, and such-like errors, which not unfrequently occur in recorded observations or in Catalogues.

It is said that Professor Challis has made great use of Dr. Argelander's last published Catalogue in identifying stars observed with the transit and mural circle of the Observatory of Cambridge, and in correcting or verifying the minutes of right ascension and north polar distance given by the observations. In cases of discordances between the results of observation and the places of a working catalogue of zodiacal stars,

1863MNRAS..23..155L

founded on the British Association Catalogue, and those of Weisse and Lalande, he was generally able to determine on which side the error lay, by means of Argelander's Catalogue; and the large number of such instances afforded good evidence of its trustworthiness and accuracy.

Argelander began his Zones in the spring of 1852, and finished them in the spring of 1859.

The number of stars to be registered is, in all, about 310,000, as follows:—

0° to 20°	105,000
20 to 40	93,000
40 to 60	69,000
60 to 80	37,000
80 to 90	5,000
	309,000

Such have been the laborious and persevering exertions of our experienced Associate to render the knowledge of our European skies as perfect as, humanly speaking, is possible by his admirable Zones in continuation of Bessel's, his beautiful Sidereal Charts, and his unequalled Survey of the heavens of the Northern Hemisphere, which comprises all the first nine magnitudes of the stars; and for which your Council have awarded Professor Argelander the highest honorary distinction which it is in their power to bestow.

My anticipation, therefore, is, that the Members will, by an unanimous vote, confirm this decision of their Council; which Council I can affirm, in all its consultations, has freely devoted the best of its judgment to this result. Indeed it has willingly employed its time to the promotion of the interests of science, and of your reputation, in all its operations during my occupation of this Chair.

The President then addressed the Foreign Secretary thus:—

Admiral Manners,—In transmitting this Medal to Professor Argelander, as an acknowledgment by this Society of his zeal, perseverance, ability, and industry, in sidereal investigation, be good enough, with your usual courtesy and kindness, also to convey to him, with our best wishes for his health and happiness, the deep interest which we have taken in his past, and which we must continue to take in his future, labours for the promotion of Astronomy.
